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NAVAL POSTGRADUATE SCHOOL
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THESIS

ACHIEVING QUALITY IN PROCUREMENT
THROUGH AUTOMATION

by

Walter W. Jacunski

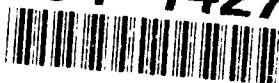
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**Achieving Quality in Procurement
Through Automation**

by

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requirements for the degree of

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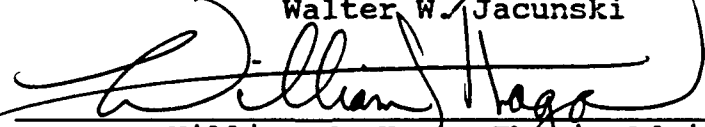
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ABSTRACT

Department of Defense has mandated that TQM be implemented in procurement. This research looks at achieving quality in procurement through the use of information systems. In doing so, it defines what quality in procurement means. The armed services' three automated systems: APADE, BCAS, and SAACONS are analyzed to see what tools they provide users to aid them in achieving procurement quality. It gives suggestions on how information systems could better be used to attain procurement quality.

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I. INTRODUCTION

A. BACKGROUND

The Department of Defense (DOD) has made a commitment to achieve total quality management (TQM) throughout the organization [Ref. 1]. Although attention is being given to quality in general, specific literature on achieving quality in the procurement arena is scarce. Recent procurement problems, such as overpricing of spare parts, indicate problems exist in acquisition. Compounding this problem is a shrinking budget. Congressional Budget Office figures show that DOD's budget has been shrinking in real terms since 1985. Recent events in Eastern Europe and the Soviet Union, coupled with the large budget deficit, project further significant cuts in the defense budget. A Navy manager must accomplish more with less.

Many in DOD feel that TQM is one solution to improved procurement. If private industry, using TQM, can do more with less, why can't DOD? Yet for TQM to work, it must exist throughout the entire organization. TQM will have to be implemented in every aspect of DOD's business. This thesis will examine how TQM can be achieved in one aspect of that business, the procurement process, through the use of information systems.

B. DISCUSSION

As stated by Mary Walton (1990), TQM was developed by Deming [Ref. 2]. It is a philosophy for achieving quality in a business. All concerned, from top management down to the basic worker, must commit to a philosophy of quality in their everyday work routine. TQM can be implemented through Deming's fourteen points [Ref. 2:p. 17-19]:

1. Create constancy of purpose for improvement of product and service.
2. Adopt the new philosophy.
3. Cease dependence on mass inspection.
4. End the practice of awarding business on price tag alone.
5. Improve constantly and forever the system of production and service.
6. Institute training.
7. Institute leadership.
8. Drive out fear.
9. Break down barriers between staff areas.
10. Eliminate slogans, exhortations and targets for the work force.
11. Eliminate numerical quotas.
12. Remove barriers to pride of workmanship.
13. Institute a vigorous program of education and retraining.
14. Take action to accomplish this transformation.

A brief focus on three of these points demonstrates the pertinence of TQM with respect to achieving improved quality in the procurement process:

Rule 4. End the practice of awarding business on price tag alone.

Although the government normally awards to the low responsive and responsible offeror, Deming's point still applies. Buyers must work to get value for what they buy. Use of properly developed evaluation criteria can be a valuable tool in achieving this goal. Buyers must ensure that value is their purchasing objective.

Rule 5. Improve constantly and forever the system of production and service.

Installing a new automation system or finding a new source of supply is just one step towards improvement. Management and workers must continually strive towards improvement in themselves and the procurement system.

Rule 6. Institute training.

All too often in a purchase shop the buyers are "too busy" to train. Training is essential to quality as it improves buyer knowledge and decision making skills which are essential to quality in procurement.

These points show that Deming's ideas are applicable to procurement quality. Yet, how to implement TQM in procurement still remains unanswered.

C. RESEARCH QUESTIONS

To research this topic, the following primary research question was posed: Can procurement quality be achieved through the use of automation?

The following subordinate questions apply:

1. What is the definition of procurement quality?
2. What do current information systems provide their users to assist them in achieving procurement quality?
3. How can these systems be better used to attain quality in the procurement process?

D. METHODOLOGY

A combination of literature research and personal interviews were conducted to answer these questions. Interviews were open ended with no surveys or questionnaires used. Interviews were conducted at:

1. Naval Supply Center Oakland, Oakland, California (September 1989).
2. Naval Regional Contracting Center, Long Beach Detachment, Long Beach, California (July 1990).
3. Naval Supply Center Puget Sound, Bremerton, Washington (September 1990).
4. U.S. Army Base, Fort Ord, California (August and October 1990).
5. McClelland Air Force Base, Sacramento, California (October 1990).

At the first three sites, interviews were conducted with buyers, supervisors, system analysts and the directors of small purchase. Site four interviews included buyers, supervisors and system analysts. Site five interviews were done with a system analyst (who had been a buyer for several years) and the director of contracts.

The literature base was mainly compiled through the Defense Logistics Studies Information Exchange, the Naval

Postgraduate School Library, and a review of various journals
and periodicals.

II. FRAMEWORK

A. QUALITY

Literature research was done to see if any work on implementing TQM in procurement was completed. Little was found. A thesis by Dowling (1986) looked at TQM and quality in field contracting. What he found was that quality was implemented through end-process inspection [Ref. 3]. This violates Deming's rule 3: "cease dependence on mass inspection." The thrust of this thesis is that the procurement process itself must become a quality process. Only through a quality process can a quality product be consistently obtained. Without quality in the process, workers will be doomed to failure [Ref. 2]. As has been stated frequently by Deming, the process causes 80% of the defects; only 20% of defects are in the workers' control. That is why Deming focuses on statistical process control (SPC) [Ref. 2:p. 8]. SPC is the use of control charts and other statistical tools to measure process performance. SPC and its methodology must be used to measure, guide and inform the manager and worker in how they and the process are doing.

The issue in implementing TQM in this domain is to make each procurement a quality buy. While this at first seems reasonable, a problem appears when one considers the volume of any large procurement activity. For instance, a Naval Supply Center (NSC) such as NSC Puget Sound, receives close to

150,000 requisitions per year. Keeping track of this volume is tough enough, let alone trying to obtain quality in each action. What can be done?

Due to the volume of procurement work, all services have made major commitments to automation. Areas of somewhat routine work, such as small purchase (buys under \$25,000) lend themselves to automation. The belief was that automation would improve procurement productivity. As a result the Services implemented the following automated systems: the Navy's Automation of Procurement and Data Entry (APADE), the Army's Standard Army Automated Contracting System (SAACONS), and the Air Force's Base Contracting Automated System (BCAS). These systems are now in full operation and an integral part of their respective procurement systems. The question is can these computer systems be used to help achieve procurement quality?

B. QUALITY DEFINED

To answer this question the concept of quality must be understood. Webster defines quality as [Ref. 4:p. 1474]:

That which belongs to something and makes or helps to make it what it is; characteristic element; attribute. Any character or characteristic which may make an object good or bad. Superiority; excellence; as a person of quality.

Another saying that is frequently associated with quality is "I know it when I see it" [Ref. 5]. From this lack of specificity, it becomes apparent that getting a grasp on what quality is can be difficult.

The problem becomes even more complex when you consider that quality depends upon an individual's or group's point of view [Ref. 6:p. 25]. For example, there are several different views on procurement quality dependent on the perspective of the requesting activity, the command activity and the buying activity.

The definition of procurement quality from the viewpoint of the requiring activity is: Procuring the desired item or service on or before the required delivery date, within budget and providing updated status when requested. This enables the requiring activity to meet their plans and stay within budget. Status information gives them the ability or flexibility to adapt to changing circumstances, for example, vendor production problems.

A different concept of quality exists at the command level. The command level is concerned with adherence to rules and regulations, such as the Federal Acquisition Regulation (FAR). Another concern is meeting command goals, such as competition and procurement administrative lead time (PALT). Thus the command level viewpoint on quality in procurement is that: It meets all applicable rules and regulations, achieves headquarters goals, at a fair and reasonable price from a responsible offeror.

A third viewpoint on quality is the one from the procuring activity itself. In industrial purchasing quality is [Ref. 7:p. 40];

related to suitability and cost rather than intrinsic excellence. The best quality is that which can be purchased at the lowest cost to fulfill the need or satisfy the intended function for which the material is being purchased.

In theory this last viewpoint is the same objective that government buying agencies should strive to achieve. However, due to Congress and command activities placing additional requirements on procuring activities, the above definition of procurement quality for a government buying activity is insufficient.

A better definition of quality from the perspective of the buying activity is [Ref. 3:p. 16]:

one that provides to the customer, the desired item or service, within the time required at a fair and reasonable price that is in the best overall interests of the Government and that is in compliance with the rules and regulations that govern such a procurement.

Having defined the three viewpoints of quality in procurement, the question of which one should be used arises. Based on the fact that the procuring activities' viewpoint incorporates perspectives of the other two definitions, it is the best overall definition of quality in procurement and is the one which will be used in this paper.

This definition gives a focal point on which to base quality. However, as stated earlier, quality must occur in the process itself. We will therefore use this definition to look at two key arenas in which quality must occur. The first looks at what the automated system provides buyers in helping them meet the elements stated in the definition of quality.

Specifically, what tools will the information system provide a buyer to ascertain price reasonableness and contractor responsibility and ensure compliance with all applicable regulations.

The second approach asks what does the system provide management to help achieve quality. Eighty percent of all problems are caused by the process which only management can change. Considering the volume of workload in procurement and the difficulties faced by management in controlling the daily workload, this study looks at what information systems are doing to help management attain quality. As stated during an interview with LCDR Ron Stearns, Director of Contracts at NSC Oakland, "The problem we had was that we couldn't get a feel of the magnitude of the problem. Before automation, just trying to keep track of the workload was a full time job." [Ref. 8].

This study examines three information systems that are currently used by the Navy (APADE), the Army (SAACONS), and the Air Force (BCAS). It will focus on what these systems provide their users to help achieve procurement quality.

III. RESEARCH FINDINGS

A. INTRODUCTION

This chapter discusses what information systems provide to help procurement organizations achieve quality. Each system will be examined from two perspectives:

1. What the system provides the buyer to achieve procurement quality.

2. What the system provides management to achieve procurement quality.

This approach is taken based upon the previous fact that 20% of the problems of achieving quality can be affected by workers. The remaining 80% is controlled by management.

B. APADE

Using our previous definition, a quality buy provides the customer with a desired item or service, within the time required, at a fair and reasonable price from a responsible contractor while complying with the regulations that govern procurement. What does APADE do to help a buyer achieve these goals?

To get a customer the desired item or service means that the buyer must understand what item or service is needed and what company can fulfill that need. The former need is normally supplied by a requesting activity. If a buyer has any doubts, he or she can ask for additional or amplifying

information from the requesting activity. Automation can help a buyer get this information. Three of the Navy sites visited are using electronic mail, which is part of the Stock Point Logistics Integrated Communications Environment (SPLICE) network, to quicken the information flow. Before automation phone calls, letters or meetings were used to exchange information. Many times this exchange was difficult. Either the buyer couldn't get in contact with the requestor or vice versa. As a result, visits by a buyer to a requesting activity to get needed information were frequent. Sometimes they occurred weekly. Because of the transit time, the result was an inefficient day of work. Electronic mail solves this problem by getting information needed to proceed with a procurement without buyers leaving their desks. Now a buyer sends an electronic message requesting additional information. Information is transmitted back to the buyer via electronic mail. No more time wasted on missed phone calls. Information is passed effectively and efficiently.

A second step in achieving quality is for a buyer to make the procurement and arrange delivery by a requestor's required delivery date (RDD). APADE helps in this area. At NSC Puget Sound, the procurement must support major customers in Japan, the Philippines, and Guam. In the past, lower priority requisitions would come via mail. High priority requisitions would come by message. Mail could take from three to four days up to three weeks to reach the supply center. This time

en route cut into procurement lead time. Time lost during requisition submission often made it impossible to meet the RDD. Requisitions, by message or by mail, occasionally were misrouted or lost resulting in customer orders not being placed. Clearly, this degrades quality. To solve this problem, NSC Puget Sound using the SPLICE network, allows major overseas customers to input requisitions directly into APADE. This eliminates the problem of loss or misrouting of requisitions and results in substantial time savings and improved customer service.

APADE's price history file contains information on past procurements for the same item. When a buyer enters a stock number, APADE provides past procurement identification numbers (PIIN) where the same item was obtained. Information such as past prices and sources are provided. A buyer then uses price analysis to determine if the government is receiving a reasonable price. Another way that APADE aides the buyer in obtaining a reasonable price is through competition. The APADE price history file contains information on all vendors who have supplied a particular item in the past. A buyer can contact those contractors to obtain price competition. In the past, competitors were found by a suggested source given by the requesting activity, their own personal knowledge of vendors, trade publications, or tools such as the Thomas Register or the Yellow Pages. In some cases, interested parties were found by synopsising a buy in the Commerce

Business Daily (CBD). While these are all useful tools, they are time consuming. APADE's price history file provides a fast and powerful tool to help establish price reasonableness.

In Mary Walton's book, Deming Management at Work, 1990, she states one of Deming's rules to achieve quality is to establish a highly reliable, high quality vendor. Congress, through the Competition in Contracting Act (CICA), has placed a premium on competition. This law is in opposition to Deming's principle of developing a quality source and then using that source exclusively. There are seven exceptions listed in the Federal Acquisition Regulation (FAR) that permit other than full and open competition, but attaining quality is not one of them. Thus, CICA presents a barrier to TQM as it requires buyers to compete every procurement possible.

However automation can assist a buyer in obtaining needed items from responsible sources. APADE can assist a buyer through the use of the Suspended/Debarred Listing that is maintained by the General Services Administration. Although a very small percentage of DOD contractors are on this list, it is important none of these listed contractors receive an award. Currently, this listing is distributed to each buyer. Before making an award, a buyer checks to ensure that a contractor is not on the list. Although not currently implemented, APADE has the capability to input this list directly into the system. The system would automatically check to insure that no vendor, who is currently on the

check to insure that no vendor, who is currently on the suspended or debarred list receives an award. This can help eliminate buyer error and ensure that a non-quality contractor does not receive an award.

To aid a buyer in complying with all procurement rules and regulations, APADE has an automated clause book. This clause book automatically inputs required clauses based on contract type, dollar value, commodity, and set aside. A buyer uses the award screen and to review the information. Adding or modifying any of the clauses can be done through the procurement identification number (PIIN) screen. The automated clause book helps to insure clauses are not mistakenly left out of the contract.

While APADE provides these tools to aid a buyer in achieving quality, this is only part of the quality process. Deming says that 20% of improvements are in control of the worker and the remaining 80% are in control of management. What can automation do to help management achieve procurement quality?

To understand the complexities of this question, it is necessary to consider the size of the task. A typical large supply activity, such as NSC Puget Sound, handles over 100,000 requisitions each year. Keeping track of this volume of procurement manually is a formidable task. In a manual process, requisitions are occasionally lost for long periods. A manager has only a general idea of what is on each buyers

desk and what their current workload is. In one interview, a manager stated that one of the valuable contributions APADE was making dealt with management reports. These reports provide such information as workload per buyer or branch, allowing the manager to better balance workflow. Another report showed work in process by customer, which gave management a better idea of how well they were supporting their customers. APADE was giving him the ability to "grasp and manage his workload" [Ref. 8]. The system was providing him information needed to manage effectively.

APADE provides a work in process (WIP) report by branch, buyer, and an overage listing. This report allows supervisors to see how much work is being done by each of their buyers. This enables them to shift workload or see where to place incoming work to achieve a better balance of work flow.

Another report lists customer by unit identification code (UIC) and provides a detailed summary listing for work performed in support of these customers. This report can be used to make forecasts on upcoming workloads. Managers can project what level of activity they will receive in the future. This information can aid in budgeting for work force requirements. It also can be used to check on customer service levels. For example, if a ship is deploying in three days, a report is run to see what work is left in house for that vessel. This enables management to focus its attention on what it needs to do to serve the fleet. Before such

reports were available, management relied on customer complaints to tell them what needed to be done. Clearly automation has provided a valuable tool to improve customer service.

One of the most used reports is the overage listing. It gives procurement actions that are over a certain age limit. Four different timeframe reports are used by the small purchase division of NSC Puget Sound. The age criteria are over one day, over thirty days, over sixty days, and over ninety days (These time limits can be changed as desired by management.) These reports allow management to see those procurement actions containing problems that may need their attention. The manager can take steps to ensure that customer needs are better met.

The following is a list of other standard reports that APADE will generate:

1. Pending Delivery
2. Customer Profile
3. Purchase History
4. Suspense Leadtime
5. Suspense Action
6. Small Purchase Workload
7. Large Purchase Workload

In addition to these, APADE also allows management to generate local reports. Programs can be generated locally and run by the ADP department to provide additional management

information. At NSC Puget Sound, a daily award release report and cancellation report by buyer code is used by management to monitor throughput. If throughput is down management can look into the reasons why and help correct them.

A price variation report is generated for internal audit. The purpose of this report is to check price variation among buys for the same item. The flagging criterion used in this report was buys greater than 50 dollars with a unit price variation over 25 percent. This report reduced the time needed by internal audit to manually search for items meeting this criterion. It gave the auditors time to research the causes for the variation. In those areas where buyer error is found, the auditors conduct training with the buyers. This training helps eliminate repeat errors and improves buyer knowledge. Reports such as these help management improve quality in procurement.

C. SAACONS

The Army's automated system, SAACONS, was examined to see how it aids procurement quality. SAACONS allows remote sites to enter their requirements directly into the system. Contracting activities can also input the requisitions. SAACONS provides the procurement shop review of the document to ensure that all necessary information such as item description, authorization, and funding are present. Once entered, the system streamlines parts of the procurement process. Once the requisition data are entered, the system

automatically assigns a buyer based on commodity class. This eliminates the need for a supervisor to review a procurement request to assign a buyer. This capability eliminates delay and saves time (in some cases days) between receipt of a request and its assignment to a buyer. It removes some of the burden from supervisors, freeing their time for other quality concerns such as training.

Another feature is the quality of the solicitation document itself. Prior to SAACONS, solicitations were often a cut and paste affair. Many times a document's appearance suffered from reproductions of reproductions. Buyers expressed their dissatisfaction with sending out work that looked inferior. Now, the system prints a clean, easy to read document. Being easier to read means fewer mistakes by contractors from illegible documents and resulting misinterpretations

To help determine price reasonableness, SAACONS provides a price history file that allows a buyer to review at what price and from whom an item previously was procured. Not only does this give a buyer price comparison data, but it suggests other sources to contact for competition. The system also has a vendor database to aid a buyer in locating sources.

SAACONS also allows a buyer to find out which vendors have outstanding orders and whether they have delivered on time in the past. This establishes a past performance record to

ascertain contractor responsibility. A bad delivery record could indicate a non-responsible contractor.

To help buyers adhere to regulations, SAACONS has an automated clause book that functions through a matrix arrangement. A system can have twenty such matrices. To choose which of the twenty matrices to use, a buyer uses type of item to be bought, such as supplies, services, or construction. Other factors include the contract type and dollar amount of award. The system automatically places all mandatory clauses into a document. Optional clauses are shown on the screen so that a buyer may place them into a contract with a yes or no response. These matrices are built by a contract specialist and are reviewed by the Army's legal staff. This review helps ensure compliance with contracting rules and regulations. Before the use of matrices, a contracting officer had to look over each clause to ensure all pertinent and no extraneous clauses were in a document. Now a contracting officer only needs check to see that the correct matrix was chosen and review the optional clauses to ensure compliance. The result is a faster, error-free process. This saves buyer, contracting officer and legal review time that can be used in key functions that lead to quality such as training.

Similar to APADE, SAACONS provides many management reports. One report, which provides average PALT, is used by management to see the time it takes to make an award. The

report can be run by branch, buyer or for the activity as a whole. Where each buyer is responsible for a particular commodity, this report can be used to ascertain the time differences that result when buying different items. For example, most people would agree that buying a computer is more complex than buying a pencil. Yet, all three services use the same PALT goal for both. Buyers procuring more complex items have more difficulty trying to achieve their PALT goal than the buyers procuring simple items. However, if management runs this report by commodity class, the results could be used to see which commodity groups take longer to buy. These results could be used to set realistic goals for each buyer. For example, giving a buyer 25 days to buy a nut is too long. Five days might be a more realistic goal. Statistical analysis could yield average times. The essential idea is not to place unrealistic time constraints for certain procurements on the buyers and doom them to failure. A SAACONS report on vendor delivery performance can be used by management to identify vendors with good delivery records with whom they should continue to do business and those with poor delivery records whom they should avoid. A cornerstone of procurement quality is vendors who deliver the right product on time. This report lets management focus in on the quality of the vendor.

SAACONS also provides an awards register by contract type. This allows management to see how many blanket purchase agree-

ments (BPAs), imprest fund, or other contract types were used. This allows management to determine, for example, if BPAs are being used enough. The idea is to use a method of contracting such as BPAs that saves time and money. This report can show areas, such as BPAs which may be improperly used, where additional training or greater management attention is needed. Additionally, this report can be done for different date ranges for trend analysis to identify, for example, a decline in BPA usage.

SAACONS provides a workload report by buyer and branch that allows an immediate supervisor to see if a buyer's workload is too great or too little and adjust it accordingly. This facilitates quality by keeping a buyer from being overloaded. This report also helps top management see if they need to authorize overtime or hire additional workers. It can also explain a rise in PALT as workload increases. Longer PALT will mean customers are waiting longer for their item. This report helps mid and top level managers plan workloads by providing historical demand data to project future requirements.

Another SAACONS report compares buyer performance, by procurement actions per hour, from month to month. It can be used to seek problem areas within the procurement process, such as when a buyer is moved to a new commodity class and performance changes. Caution should be exercised when using this report as it has the potential to impede quality. For

example, if used to pressure a worker to do more work. A buyer might respond by increasing quantity at the expense of quality.

SAACONS also allows ad/hoc reports. One report provides how much effort was spent in support of a special exercise, such as "Desert Shield". Another shows the number of awards and dollar amount awarded by each contract type. A third report shows the number of contracting actions performed and the average output per worker. This report, which goes to Army Headquarters, is used to compare different buying activities. High performance activities could be visited to see how they attain their results. These methods can then be used at other sites to improve their performance.

Ad/hoc reports are one indication that the SAACONS database is flexible. A variety of reports can be generated to help supervisors and mid and top level management do their job better in attaining quality in procurement.

D. BCAS

The Air Force uses a base contracting automation system (BCAS). BCAS provides a price history similar to the other two systems. However, it automatically gives a buyer the price history with each procurement request, thus saving time. A requestor goes to the supply system to see if the desired item is carried in stock. If not, the supply system's computer automatically creates a file with all necessary procurement information, such as item name, quantity, and

funding and passes it to BCAS for open purchase. BCAS automatically assigns a buyer based on commodity class and provides price history information such as unit price, from whom the item was bought and when it was last bought. If an item was bought within the last 60 days and the priority is routine (priority nine and above), the system will automatically award the procurement to the same vendor. This results in a zero day PALT. The system will not give an automatic award to any vendor who has a delinquent delivery status. For this method to work, a vendor must honor the same price as was given under the previous order. Also a order must fall below the small purchase limit of \$25,000. When these criteria are met, this automatic process can take place up to four times with the same vendor. After the fourth time, the buy is made under normal procedures. This method helps reduce average PALT for routine requisitions.

To control contractor responsibility, BCAS is linked to the logistics center supply system. When receipts are made at the center, the date of receipt and condition of material can be entered into the supply system's computer. This information is transferred into the BCAS system. The condition of the material is either acceptable or unacceptable. The latter receives a quality deficiency report (QDR) which is noted in the BCAS system. On any given day, a buyer can check a vendor's delivery performance. A drawback of BCAS is that receipt information must be inputted manually.

With manpower shortages due to hiring freezes, inputs happen far less frequently than is needed. Thus the accuracy of the report isn't of high enough validity to be depended upon completely. Additionally, contract modifications which alter the delivery date or change the specifications are often done off-line. This further degrades the data base as the system has no record of the change. When this happens a vendor may be charged as being delinquent or providing the wrong material, when that was not the case. According to the system, the delinquency rate for vendors serving McClelland Air Force Base for fiscal year 1990 is less than 1%. However, individuals interviewed in this study felt the real delinquency rate was closer to 20%. The Air Force is working on this problem by training its buyers to enter all modifications into the system. The input problem, although noted by management, isn't receiving the attention it needs.

Another feature of BCAS is a daily report showing orders that are delinquent. The system automatically generates a letter that is mailed to a contractor stating that they are delinquent and requesting they comply with the contract and deliver the material. For high priority requisitions (priority one through eight), a data sheet is generated that gives vendor name, phone number, point of contact, item description, quantity, and delivery date so a buyer can call and follow up on the procurement. This shows vendors that they are being tracked and that timely delivery is important. At an Air

Force base that processes over 80,000 requisitions annually, without an information system like BCAS, it would be impossible manually to keep track of delivery status and vendor performance in a timely manner.

The BCAS system provides buyers with suggested sources of supply in terms of the name of the vendor who last supplied that item and a list of other potential sources. This saves a buyer time and helps them in attaining competition.

The system automatically provides clauses to the buyer. Based on contract amount, contract type, and commodity being purchased the system will automatically insert a series of required clauses. Next, optional clauses are shown on screen to a buyer. A buyer selects those optional clauses that apply. Finally, any locally prepared clauses that are unique to a particular site, are contained in the system. A buyer can select those local clauses that apply for inclusion. This eliminates cutting and pasting of clauses. Mandatory clauses are included, which eliminates errors. These are the tools BCAS provides the buyer in achieving quality.

For management BCAS provides a base contracting activity report, which tells the amount of work received, what priorities were used and the amount of work in process. It also stratifies procurements by dollar value. This information is given for each customer. Besides giving statistics showing what the activity does, this report can be used for workload planning. By looking at past reports, top

and mid level management can project future workload and plan accordingly.

Another report looks at manpower output and breaks work down into 26 action groups by contract type. Supervisors and mid level managers can review usage of imprest fund or BPAs to see if there are problems with usage of different contract types. Without an information system, such a work breakdown is time consuming and prone to errors.

A third BCAS report provides information on PALT by customer and requisition priority. The Air Force uses three different PALT goals based on priority. For priority one to three, the goal is five calendar days. For priority four to eight, it is seven calendar days. For priority nine to fifteen, the goal is thirty calendar days. It is worth noting that using calendar days vice work days, especially when dealing with five day PALT goals, can be unfair and can result in lower quality. If a priority three requisition comes in on a Friday before a three day weekend, then the chance of meeting the PALT goal is difficult. In essence, the award would have to take place in two days. This time pressure could cause a buyer to cut corners. Errors reducing the quality of the procurement include such things as foregoing competition requirements, awarding a contract to a non-responsible source, or failing to meet the customer's required delivery date.

This Air Force PALT Policy report requires buyers and management to give consideration to their customers' needs by assigning different PALT goals for different priorities. In contrast, Naval Supply Systems Command uses one overall PALT goal for each major field contracting activity. A buyer must meet the same PALT goal for any requisition, whether it is priority one or priority fifteen. Although Navy buyers are trained to work high priority items first, their PALT goals do not reflect this. By making three different PALT goals for different priority requisitions and providing the PALT report for management use, the Air Force matches their goals with their customers' desires. This serves to improve the quality of the procurement process as earlier defined.

This report, which gives PALT by customer and priority, enables all levels of management to see if any problems are occurring with meeting the established goals. If there are problems, then corrective action can be implemented. Another benefit is the report may identify abuse of the priority system (i.e., using too many high priority requisitions to get more attention). As an alternative, the buying activity could suggest that a customer use priority nine and above, so that the automatic award feature of BCAS could be used. This lowers PALT by eliminating the time required to fully solicit a buy. It also prevents abuse of the priority system, thus improving customer service.

BCAS also has ad/hoc report capabilities. One report provides statistical comparisons, such as PALT and priority requisitions, between logistics centers. The uniqueness of this report is that it is voluntary. Air Force headquarters does not require these reports. The logistics centers share them so they can compare performance and exchange ideas. If a center is doing well in one area, then other centers can see how they are doing it. The key is that headquarters is not using this information for evaluation. If they did, the result might be inaccurate reporting or decreased information flow between centers to protect their comparative advantages.

IV. ANALYSIS AND RECOMMENDATIONS

A. ANALYSIS

Several of the reports mentioned in Chapter III are used by all layers of management, especially the supervisory level, to measure buyer performance. An average rate of buys per hour is computed based on all activities output divided by the number of people that work there as buyers. If an activity averages one hundred buys a day and has ten buyers, then each buyer's target is ten buys per day or 1.25 buys per hour. This is a simplification of how the process works, but it is close to the way performance parameters are obtained. The problem with this type report is that some buyers are going to be above average and some are going to be below average. This is the nature of averages. Yet, if managers use this report to compare buyers, they are dooming some buyers to failure. This is clearly contrary to Deming's TQM philosophy [Ref. 2:p. 18], in particular rule 11 "eliminate work standards and numerical quotas." Even if such a report allows management to identify people who are poor performers and results in their dismissal, it won't help solve the problem of obtaining quality. This brings to the forefront one of the fears that people have with automation: it will be used against them. This violates Deming's eighth point: "drive out fear" [Ref. 2:p. 18]. Workers start to resent an information system. They start to find ways to make it fail. Management must

avoid using reports in this manner. A better use of this report is for looking at ways to improve the process, such as identifying those employees who need additional training, or if run by branch and compared with past data to see if branch performance is improving over time. Using the report this way is a positive way to improve the process.

The real problem is trying to obtain quality in the procurement process when management confuses quantity of output with quality. Each activity visited in this study focused on how many awards they were making and how long it took to make them. How many awards were made was both management and the workers' focus.

Looking at the system generated reports (those that are not ad hoc) reveals average PALT and output per worker were the major focus. This is most likely due to the design focus being on quantity vice quality. At the SAACONS' site, 16 of 20 input clerks were eliminated through improved system efficiency. At the BCAS site 95 buyers were achieving the same total output as 116 buyers had the previous year. This increased productivity is credited to the information system. However, productivity gains are not necessarily quality improvements. When asked if their customers were receiving better support, there was no clear answer. No one knew.

Many top and mid-level managers felt that the lower the PALT, the better their customer service. In a study of SAACONS' productivity, Linson and Barclift (1988) stated that

"PALT is a measure of quality" [Ref. 9:p. 25]. This is an erroneous conclusion. PALT, in and of itself, is not a measure of quality. If a buy is made in one day, yet does not adhere to the regulations and the price is twice as much as warranted, it is not a quality buy. Comparing such a buy to one that took five days to make at half the price, is wrong. PALT must be considered as only a part of procurement quality, not as the sole measure of quality.

PALT should not be entirely abandoned. If a customer needs an item in twenty days and it takes thirty days to make award, then quality has suffered. The measure that is important is when the customer needs the item or service. So, rather than using PALT, the number of procurements meeting the customer's required delivery date (RDD) would be a better measure of quality. One argument against using this criterion is that the requiring activities RDDs are usually unrealistic. The buying activity is there to serve the customer and if a customer needs an item in five days, then a buying activity should do what it can to meet that customer's desires. If the five day requirement cannot be met, then a customer should be contacted and have the situation explained. What currently happens is that buyers ignore the RDD and they don't bother to contact the customer. Valuable information is not exchanged and the customer is not served. Procurement quality is lowered.

B. RECOMMENDATIONS

This trend of focusing on quantity vice quality will continue as long as management concentrates or fixates primarily on productivity measures. "The more awards the better" mentality will hinder efforts aimed at improving quality in the procurement process. To move towards improved quality the following actions should be taken:

1. Develop Vendor Quality Data

Keep track of vendor delivery status. This means entering data on when material is delivered and in what condition. The objective is closing the procurement loop. The current focus is on awarding the contract. Once the contract is awarded, the buying activity feels its job is done. Only when their customer complains about delivery does a buying activity check on a vendor. By maintaining vendor performance data, responsibility checks could be easily performed by buyers. Those vendors with a poor performance record could have a penalty placed against them. An example is the Air Force's "Blue Ribbon Program", where vendor's who have a record of 90% or better on time delivery of a satisfactory product receive a discount applied to their price quote. For example, a 10% discount could be given to high performance contractors. If their quote is \$100 dollars and a low performance contractor's quote is \$95 dollars, then the high performance contractor's quote will be evaluated as \$90 dollars (\$100 dollars minus a 10% discount factor). Award is

made to the low offeror, in this case the high performance contractor for \$100 dollars. Superior delivery performance is rewarded.

2. Restructure Management Reports

The PALT report can serve as an example of a report that should be restructured. Currently, only the Air Force measures PALT by priority. PALT should be measured by commodity class and priority. Buying a simple item like a pencil takes considerably less time than buying a computer. Yet PALT is not measured by commodity class. The Army and Air Force sites do measure this to a certain extent. Their buyers are structured by commodity class; thus when they measure buyers PALT, they actually are measuring commodity PALT. Unfortunately, they are not viewing it this way. The information is not used to analyze differing PALT by commodity class. Buyers are measured against the same PALT goals regardless of type of item procured.

What needs to be done is measure PALT by commodity class. Upper and lower control limits need to be set on each class. Past historical data on a normal sample for each class would be used. Based on this sample, statistical analysis would determine the mean and standard deviation for each commodity. By using the mean, plus or minus two standard deviations, upper and lower control limits would be set. The result is that 95 percent of the buys should fall within these limits. A figure greater than five percent of the buys

exceeding these limits indicates the process is out of control.

Currently, management uses 30, 60, 90 day PALT ages for all items as a control. As previously discussed, this is an ineffective tool. Items differ as does their average PALT. Using one goal for different items is a mistake.

3. Initiate the Use of Statistical Process Control (SPC)

To solve problems, they must first be identified. In procurement, especially in large volume procurement, this is difficult. SPC can identify areas where improvements can be made. For example, through SPC, management might see that buyer A is under two standard deviations of the average PALT. Buyer A may be a superior performer who deserves commendation or buyer A may have found a way to make the system work better. Buyer A may not even realize that his or her methods are not being used by others. SPC can identify areas such as this. Management can look into these areas and see if the system can be improved.

4. Improve Communications

Communication flow between the buyer and customer needs to be improved. Communications are essential to procurement quality. For example, a buyer often has questions concerning a procurement. These questions vary in complexity from color choice to explanations about how a satellite system will interface with other communication systems. A phone call can work, but many times the person who can answer the

questions isn't there. An information system can help. Electronic mail provides a method of communication without the need for simultaneous presence. Each of the three systems reviewed possess this capability. However its use was limited. Many buyers were uncomfortable with using this feature. Training is needed to emphasize the value of and how to use electronic mail. Buyers spend hours on the phone each day. Yet phone calls do not always work. The chance of a person calling the buyer and getting a busy signal or finding the buyer otherwise occupied is, according to conventional wisdom, six out of seven.

5. Use Technological Innovation

As information systems grow in capability, DOD needs to grow in its use of this technology. Use of electronic bulletin boards for information exchange are an example of using technology to improve the procurement process. A buyer spends several hours each day on the telephone trying to exchange solicitation information. Busy lines or the person needed to quote not being available are two of the recurring problems associated with use of telephones. A better way to exchange solicitation information would be to use electronic bulletin boards instead of telephones.

Naval Supply Center Jacksonville has instituted such a system. They have replaced the telephone with the Electronic Assisted Solicitation Exchange (EASE) system. EASE uses a CompuServe telecommunications program tailored for it.

Any MS-DOS compatible personal computer with a modem and an account number can be connected to the CompuServe network. Vendors must first be given eligibility by NSC Jacksonville to join the EASE users group. Once approved, vendors are able to browse through requests for quotations (RFQ), download those to which they want to respond, and upload their quotes using the EASE bulletin board. The government buyer downloads the responses, analyzes them and makes award.

This system saves time for both buyer and contractor. It improves competition by giving greater visibility to Navy requirements. EASE is available twenty four hours a day so it allows contractors convenient access. A system, such as EASE, can also improve productivity. EASE means less buyer time is wasted on unproductive phone calls. That means more buyer time can be spent determining price reasonableness and vendor responsibility. Improved quality results. Additionally, greater competition helps meet competition goals and provides additional sources who may be better able to meet customer needs. For example, a greater vendor base may mean being able to find a vendor who can meet a requiring activity's urgent delivery date.

EASE is just one of the ways that DOD can use technological innovation to improve the procurement system. Other recent examples include implementation of the Federal Acquisition Regulation (FAR) on compact disc read only memory (CD-ROM) and illustrative listings of items on CD-ROM by

national stock number. The former allows the buyer easy access to information contained in the FAR. One of the common complaints made by buyers is that it takes "forever" to find something in the FAR. Use of computer based key word searches would help facilitate information gathering.

Illustrative CD-ROM listings help buyers see what they are procuring. This helps a buyer make a better price analysis. Spending \$100 dollars on a radar adjustment device might seem reasonable. However, if a buyer sees that this device is an ordinary crescent wrench, then the chance of the buyer paying \$100 dollars for it is reduced. Employing such technological capabilities offers the opportunity for improved procurement quality.

6. Increase Shared Data Base Use

There are many data bases which contain useful information. The Defense Contract Management Command (DCMC) has a great deal of information on vendor performance. DCMC has information ranging from pre-award survey data containing financial, management, and other information to post award information such as delinquency rates and quality issues. These data are critical to responsibility determinations. As each vendor who does business with DOD is assigned a Contractor and Government Entity (CAGE) code, it is easy to access their performance data. Additionally, the database contains vendors on the Suspended or Debarred listing.

This information should be used to preclude the making of an improper award.

V. CONCLUSIONS

A. CONCLUSIONS

Top level management needs to adopt Deming's philosophy of TQM. Procurement quality improvement is possible only with the commitment of everyone in the organization. If top management adopts TQM first and insists on its implementation, all tiers of management will follow. The work force will soon join in. Throughout this process training is crucial. Training can enhance the talents of the work force, as well as management. All strive towards improved quality.

Information systems are essential in this process. Before information systems, there was no way to get vital information quickly. There were too many data to extract. Information systems enable management to better deal with quality problems. Reports can be restructured to more effectively measure quality. Customer's RDD and vendor performance are examples of two of these measures. The beauty of information systems is that the databases are flexible and can be used to obtain information without major effort. The problem has been management's focus on productivity, not the system's lack of information. By refocusing management on procurement quality vice productivity, new reports can be generated that provide management with information which can be used in achieving procurement quality.

B. SUMMARY

Procurement quality can be improved through the use of automation. The researcher found that each of the three automated systems provided buyers with many tools that can help achieve quality. Examples of these are: price history files, automated clause matrices, and vendor performance files.

These systems also provide management with a variety of reports that can aid them in achieving quality. Customer profile and workload report by buyer and branch give management information to better control workflow and improve customer service. These buyer and management tools improve procurement quality.

However, these information systems can be better used to attain quality. Currently, management and therefore buyers are focusing in on productivity vice quality measures. Reports giving information on number of awards and average PALT per buyer are being used as productivity measures. Sometimes these reports are used to discipline buyers for poor performance. A better use for these same reports would be to identify buyers who need additional training. The key consideration is refocusing management and workers' attention on quality vice productivity.

To accomplish this goal, the researcher has provided six recommendations. Restructuring management reports and initiating use of SPC can help management focus its attention

towards quality vice productivity measurements. Improved communications and sharing databases provide buyers with information needed to improve the quality of their work. Using technological innovation, such as EASE, can free buyers' time. This time can be used to make better price reasonableness and contractor responsibility determinations. A higher quality buy results. Using these six recommendations can further improve quality in the procurement process.

C. FUTURE AREAS OF RESEARCH

This paper discussed that Naval Supply Systems Command uses one PALT goal for each activity to achieve in their small purchase actions. For example, at NSC Puget Sound, the goal is twenty five days, unless it is for a ship, then it is five days. These goals do not take customer priority into account. A hypothesis could be that as PALT goals do not take priorities into account, no statistically significant difference in PALT will be found between various priorities.

Another area to consider is looking at PALT by commodity class. Questions to be answered would be:

1. Are there differing PALTs for different commodity classes?
2. If so, what should PALT goals be for each commodity class?

A third area for further research is finding ways to measure quality through the use of the information system. Currently, PALT is used by commands as a measure of quality. As discussed earlier, while easy to access, PALT by itself is

a misleading measure of quality. Some suggested alternatives for consideration include measuring the number of contract modifications required to correct pre-award work. Another measure might be number of awards whose estimated delivery date was on or before the customer's required delivery date. These three areas all warrant future research.

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